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ABSTRACT

Two versions of this Preserved Context Indexing System (PRECIS)/school library materials project, funded by the Ontario Ministry of Education, are presented: a narrative report and a technical report. Designed for interested readers who are not familiar with information science terminology, the narrative report summarizes the development of this computerized system for producing subject catalogs. The landmark PRECIS implementation at Aurora High School (Canada), other international applications, and catalog form/content development are discussed, leading to lists of immediate and long range objectives. The technical report treats the same topics with a more specific technical account including background, project setup and personnel, the automation process, products of the system, information dissemination, and systems development. Objectives are analyzed and their attainment evaluated, followed by recommendations. A glossary of terms used in the technical report, bibliography, a sample PRECIS printout, and a list of related conferences, workshops, and consultations complete the report. (SW)

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A COMPUTER-BASED CATALOGUE LINKING THE PRECIS SUBJECT INDEXING SYSTEM TO SCHOOL LIBRARY MATERIALS

BUILDING A MODEL FOR AN ONTARIO-WIDE INFORMATION NETWORK FOR SCHOOL LIBRARIES USING PRECIS: A DEVELOPMENTAL RESEARCH PROJECT

Report of Work July 1976 - September 1978
Funded by the Ministry of Education, Ontario,
through the Grants-in-Aid of Educational Research Program

October 1978

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A B S T R A C T

There is ample evidence of acute need for a better system of subject indexing. Increased ease, efficiency, and speed in locating information is essential for today's students and teachers. This is a direct outcome of the growth of resource centres in Ontario. Since the mid-sixties, small classroom libraries have expanded into areas designed to house large multimedia collections supporting an ever more diverse and complex curriculum. School libraries have not yet taken advantage of the new technology and developments in library and information science.

In York County, in 1971, Audrey Taylor was given a mandate to create an innovative card catalogue designed to give improved subject access to the materials in the Resource Centre of Aurora High School, which opened in 1972. The decision was made to adapt PRECIS (an indexing method designed for the computer) to a manual mode, keeping in mind the eventual possibility of automation.

By 1975 the Aurora High School experiment with a manual application of PRECIS was judged successful. Since a computerization of the innovative catalogue brought into existence at AHS might enable a province-wide school library information network, the Ontario Ministry of Education was asked for a Grant-in-Aid of the proposed developmental research.

The intent of the project, now realized, was to link a PRECIS index to computer-stored bibliographic data and to produce a model catalogue in COM (Computer Output Microform). This has been accomplished through the facilities of the University of Toronto Automation Systems (UTLAS). The products of this project, the AHS catalogues (author; title; subject using PRECIS) on microfiche, are appended to this report.

A working model which could serve as a base for the future development of an Ontario school libraries cataloguing network is now in place at Aurora High School.

How to use this Document

An attempt has been made to meet the different needs and background of readers of this document.

A "Narrative Report" section has been offered for interested educators (or others) who do not possess expertise in library and information science or in computer science. The emphasis has been placed upon the rationale for this developmental research project and its history from the early 1970's. Related work in other jurisdictions is noted so that this project can be understood in its context and also so that its potential (as part of an international effort to advance information science) can be appreciated. The objectives are described and immediate objectives which have been attained are noted briefly.

A "Technical Report" section delves in greater detail into the processes of this study. Professionally trained librarians will find few if any difficulties with the concepts or the particular terminology of the PRECIS procedures. The layman who has first read the "Narrative Report" and who is prepared to consult the Glossary which follows the "Technical Report" will be able to understand much if not all of the detail. Very few readers will find difficulty with the last parts of this section which detail the attainments and recommendations flowing from the work undertaken between July 1, 1976 and September 30, 1978.

The production of a school library subject catalogue using the PREserved Context Index System (PRECIS) and employing a computer-stored bibliographic data base was the immediate intent of the project. Specimen pages from the printed subject catalogue and a complete microfiche set of the Computer Output Microform (COM) catalogues (author, title, subject) are appended. While these products are the proof of the present pudding, they are only milestones toward the establishment of a province-wide cataloguing/information network for the school libraries, the ultimate goal of this work. When that goal is reached costs will be optimized, sharing of resources eminently feasible, collection-building rationalized, and users -- students and teachers alike -- in an excellent position to know very precisely just what resources can be accessed.

Given that resources are ever harder to acquire but that the information (and curriculum) explosion will continue to place ever greater demands on teachers, librarians, and learners, the attainment of the long range objectives cannot come too soon.

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A COMPUTER-BASED CATALOGUE LINKING

THE PRECIS SUBJECT INDEXING SYSTEM TO SCHOOL LIBRARY MATERIALS

NARRATIVE REPORT

1. PRECIS and recent developments in library and information science

In the late 1950's, traditional library systems were in danger of breaking down. Five hundred years ago, Europe produced books at the rate of 1000 per year. By 1950, this had increased to 120,000 per year. National bibliographies as well as individual libraries were expanding rapidly. By the mid-sixties, the world output of books had risen to 1000 per day. This figure does not include the proliferation of journals, research and technical reports, government documents and information in other formats -- film, tape, etc. Today, increasingly complex and multifaceted subjects combine with the rapid introduction of new concepts to defy classification by traditional schemes and subject indexing by traditional subject headings.

The primary need has been to eliminate duplication by recording the cataloguing information for a single title once only. This information can be shared. The computer now allows us to store the cataloguing information in a data base and distribute it to a network of libraries. In the United States in 1965, the Library of Congress implemented a format for machine-readable cataloguing (MARC) which enables the sharing of the data by means of magnetic tape.[1] In the interest of international exchange of information, this format has been adopted by other countries with certain adaptations for their internal needs. This has led to the development of national and regional bibliographic data bases of which the University of Toronto Library Automation Systems (UTLAS) is an example. UTLAS now serves a number of Canadian universities, Centennial CAAT (as successor to the College Bibliocentre) and many public library systems.

The MARC format provides for inclusion of subject information in the cataloguing record. Generally this is in the form of Library of Congress subject headings. These headings, derived from a printed authority list, were designed for use in card catalogues, not for automated systems; they do not provide the multiple index entries which the

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1 Readers not familiar with the technical terms and acronyms of the modern information sciences are advised to consult, as needed, the Glossary which appears at the end of the Technical Report section.

computer can so easily generate. They lack currency, preclude the introduction of terms drawn directly from the material being indexed, and distort natural work order. These inadequacies are also common to the Sears List of Subject Headings used in schools and the Canadian subject headings created to supplement American lists.

When the British National Bibliography assumed responsibility for contributing British cataloguing records to the interantional MARC network, a computer-produced subject index was found to be essential; the computer could only be used to full effect by devising a means for deriving a complete set of index entries out of a single string of coded terms. The result was PRECIS (PREserved Context Index System), first used in 1971 to produce the subject index to the National Bibliography catalogues. Significant features of PRECIS are: the open-ended vocabulary taken directly from the materials indexed; natural language order: subject statements (strings) which include a number of terms, each set in context with the others to describe precisely the contents of a document; the capability to make any or all terms in a string become index entries.

PRECIS is a set of working procedures requiring human intellectual effort both in subject analysis and indexing. The indexer has the freedom to select terms and concepts found in the materials, choose which should appear as index entries and store them immediately in a machine-held file. The terms in a string are set into a pattern prescribed by a grammar closely resembling that of natural language; this pattern is controlled by a set of role operators assigned at the time of writing the input string. The computer shunts the terms into their various positions, producing a full set of entries from a single input.

The PRECIS entry consists of three basic positions -- the "lead" which provides the access point, the "qualifier" which appears on the same line as the lead, setting it into its wider context, and the "display" which occupies the second indented line containing the terms which are themselves context-dependent on the lead term. For example:

Pollution. Rivers
Effects on migration of salmon

The syntactic side of the system is complemented by the equally important semantic side which creates the references between semantically-related words. The terms selected during the indexing process, together with codes which establish their relationships to higher generic and other associated terms, are assigned to another machine-held file. These are interfiled with the index entry terms as "See" and "See also" references in the subject index.

The use of PRECIS in a variety of applications has spread internationally, particularly since the 1974 publication of the definitive manual by Derek Austin, originator of PRECIS. PRECIS indexes and pilot projects are to be found not only in Great Britain, but in Australia, France, Malaysia, South Africa, India, Denmark and Canada.

The form of the library catalogue is also undergoing change. For nearly a century, the card catalogue has provided the most popular and seemingly most efficient method of gaining access to library materials. Recently the effectiveness of this tool has been questioned by information scientists and librarians. The automation of cataloguing data has renewed interest in the book catalogue; it is portable, requires little storage space and is more easily scanned than a drawer of cards. From magnetic tape, book catalogues and supplements can be produced easily, quickly and in quantity in a variety of sortings, e.g., author, title, subject indexes. The capability to transfer this information from computer tape to microfilm or microfiche is now available. COM (Computer Output Microform) has advantages over the book catalogue: it is cheaper, requires minimum storage space, is easy to handle and is an increasingly familiar form to the general public. While microforms require equipment in order to be read, the hardware is improving. That users react positively is indicated in an article on the Bath University Comparative Catalogue Project (1974)[2]:

> Our users castigated the Card catalogue for being "hard to keep your place in the cards while writing", "slow if you haven't got long nails", "clumsy", "inconvenient because hard to find your place in the cards",... "tedious -- too easy to miss what you want because you can't see the entry before or after".... On the other hand, our Fiche catalogues were praised for being "fun to use", "fascinating",... "can sit in one place and use small area of the room to write in, therefore, convenient", "good because of random access facility", "it's simpler than cards"....

As of 1972 elementary and secondary school libraries had not begun to share in the developments that are beginning to revolutionize access to information in other educational institutions. Hesitating to come to grips with the complexities of the new technology, they perpetuate costly and inefficient systems. Many teacher-librarians continue to catalogue the identical document, expending time and energy better spent working with students and teachers. The alternative is to buy the cataloguing from a commercial

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2 Bryant, Philip and Needham, Angela. "You need long nails", Catalogue and Index, No. 33, (Spring, 1974).

firm. In either case the levels of consistency vary. The advantages of being able to avoid duplication and to share cataloguing information seem obvious. The subject index entries used in school libraries are derived from the authority lists already mentioned; they are inadequate for the needs of the users. Of particular concern is the need for depth and specificity in the indexing of Canadian materials. PRECIS provides the opportunity to bring to school library indexes terminology that is current, suitable to the level of the user, and precise in its reflection of curriculum content.

2. The Aurora High School Card Catalogue: Precursor to automation

The apparent limited use of the card catalogue provided in school libraries at considerable cost has been a matter of some concern to administrators and librarians in York County. Much valuable information is overlooked by students and teachers. The situation has become more acute since the mid-sixties as small classroom libraries have expanded into resource centres with large, multi-media collections supporting a diverse and complex curriculum.

In the Spring of 1971, Irene McCordick, Master Teacher of Libraries, the York County Board of Education, and Audrey Taylor, then on sabbatical at the School of Library and Information Science, University of Western Ontario, found they shared a concern to find an improved method of subject indexing for school resource centre collections. With the building of a new secondary school in York County, it became possible to attempt a new approach to its card catalogue. Three principal goals were identified: to provide depth and specificity in the subject indexing; to use terminology found in the library materials and the curriculum; to draw together information scattered throughout the shelves by Dewey Decimal Classification.

In the autumn of 1971, the Administrative Committee of the Board of Education supported the implementation of the PRECIS approach as recommended by Audrey Taylor for the new Aurora High School, which opened in September, 1972, with Mrs. Taylor as librarian.

Consultation with Professor Ann Schabas of the Faculty of Library Science, University of Toronto, and with Gordon Wright, then Director of the College Bibliocentre, confirmed the decision to use PRECIS, adapting it to a card catalogue. The desirability of eventual automation of the system was never lost from sight. It was clear that the full potential of PRECIS could be effectively explored and tested only in machine form.

By early 1976 more than 7000 titles in the AHS Resource Centre had been manually catalogued and indexed, including fiction and non-fiction, print and nonprint items. Despite the fact that, in the early stages, the work of indexing was a matter of "learning by doing", the final product did not diverge in any essential from the principles of PRECIS. This was confirmed during a series of discussions with Derek Austin in July, 1975. Aurora High School was subsequently included in the official international list of PRECIS users.

It had been observed that long bibliographic entries in the traditional card catalogue are disregarded by most users. Hence the decision at AHS was to use short citations -- classification number, author, title, edition and date in all computer-produced catalogues (see Appendix "A").

these data are sufficient for the location of material -- the primary function of the catalogue.

PRECIS is notable for its built-in syntactic consistency and fully developed reference structure. Constant use of a PRECIS index may well be a factor in developing the student's skills in investigation and ability to use language with precision. In a communication to Irene McCoardick, Kenneth A. Stanley, a superintendent with the York County Board of Education, stated that he finds exciting "the probability that the learner will have brought to his attention sources and directions of inquiry that he would not have thought of himself". Only in-school research beyond the scope of the present project can fully assess this potential.

3. International Applications of PRECIS

In addition to the project at Aurora High School, there have been a variety of studies and applications of PRECIS throughout the world. The Project Officer has kept in close touch with these particularly relevant activities in order that experiences be shared for mutual benefit.

ONTERIS (Ontario Educational Research Information System), directed by Barbara Beardsley, is a contractual project initiated by the Ministry of Education with the Metropolitan Toronto School Board. This is a developmental system for access to Ontario educational research. Over 1200 documents have been abstracted and the abstracts stored in a computer file. Both PRECIS terms and keywords in the abstracts are being used for on-line search. The terms within a PRECIS string are used as major descriptors for on-line searching. PRECIS is also used for the printed subject index to ONTERIS abstracts. The PRECIS terms help the user to determine, without recourse to the abstract, whether a document is likely to meet his needs. ONTERIS: Printed Index appeared in two volumes in 1977. Volume 1 contains the Abstracts and Volume 2 the PRECIS subject index and author index. A second publication expected shortly consists of a second volume of Abstracts and a cumulated subject and author index to all Abstracts.

Professor Ann Schabas, Faculty of Library Science, University of Toronto, was a member of the British PRECIS developmental team, 1969-70. Her doctoral dissertation, now nearing completion, is a comparison of PRECIS with Library of Congress Subject Headings in retrieving materials.

Wollongong University Catalogue Study, Wollongong, New South Wales, Australia, has made a comparative study of two indexing systems -- PRECIS and Library of Congress Subject Headings. The published reports contain much of value, particularly in the area

of techniques for assessing user reaction. Their manual application of PRECIS in a number of different ways in card and book catalogues was central to their study.

Sheffield College of Education, England, like Aurora High School, developed for its library collection a one-stage catalogue with PRECIS entries, using the system in a manual mode on cards. The users of the collection are adult teachers-in-training. The librarian, Richard Smith, exchanges information with the Project Officer in Aurora.

The Canadian Nonprint Project, funded by the Ontario Ministry of Education and headed by Ms. Helene Hothwell, is preparing a catalogue of Canadian-produced filmstrips recommended for schools. This project will include a PRECIS index, and has sought advice from the Aurora PRECIS staff.

The National Film Board of Canada, after careful consideration of a study done for them by Professor Mary Dykstra, School of Library Service, Dalhousie University, has decided to adopt PRECIS for subject access to its own 16mm films and others of Canadian origin. The decision has important implications for School Boards since these films form a valuable part of their film libraries.

Media Resources Centre, Inner London Education Authority, London, England, has used PRECIS for indexing their filmstrips. This project was begun in 1977 as part of the study sponsored by the British Library in association with ILEA.

The European Documentation and Information System for Education, has run a pilot project with the British Library to index audio-visual materials with PRECIS in English, French and German. This work provided the basis for current translingual research studies by the British Library. Multilingual countries such as Canada should benefit greatly from an indexing system with proven translingual capabilities.

8. Developments in catalogue form and content

In the early 1970's, librarians at Bath University in England developed the Bath Mini-Catalogue in order to test the effectiveness of short bibliographic records in the card catalogue. Out of this study grew another, the Bath University Comparative Catalogue Project. This two-year research project began on March 1, 1977, with two aims: to compare various catalogue forms (card, printout, COM roll-film and COM fiche) in terms of ease of use and cost-effectiveness; to evaluate user reaction to the short entries. The Aurora proposal included in its objectives the production and use of microfiche catalogues with short

entries. Interim results available from the Bath project appeared to validate this choice.

The subject catalogue for the large library collection of the Ryerson Polytechnical Institute in Toronto had by 1976 been produced on microfiche using short entries. After some months of trial, user response was sufficiently positive to justify discarding the subject card catalogue. Microform catalogues are now (1978) used locally at the University of Toronto, Sheridan College of Applied Arts and Technology, the Mississauga Public Library as well as Aurora High School, for example. Library users have happily adapted to "the screen."

5. The particular contribution of this study to the field

Problems of subject indexing have generally been addressed by librarians in the field of technical services. Work at AHS had its origin in a concern for students. At all levels in schools today independent inquiry is stressed. Audrey Taylor and Irene McCordick, teachers as well as librarians, observed students attempting investigation in the library and being frustrated. The main thrust of the project is to provide a type of subject indexing that responds to their needs. Derek Austin, in a communication of February 5, 1976, to Audrey Taylor has stated, "As far as I know, you are unique in being the only institution applying PRECIS to a school collection." Thirty months later this is still the case. The long-term objective is that all schools share a centrally-generated PRECIS file linked to a data base that can provide the cataloguing data.

6. Immediate objectives of the study and its relevance to education in Ontario

The work done at Aurora High School since 1972, and especially the Ministry-funded work toward automation of the bibliographic data and PRECIS indexing, has value only if viewed in the context of the needs of students in Ontario. While the long-range objectives are of primary importance, they can be achieved only after the immediate goals have been attained.

1. To join the UTLAS bibliographic network in order to gain access to an automated bibliographic data base of over a million records and to the PRECIS computer program.

2. To build and evaluate a computer-generated catalogue based on the card catalogue developed in the Aurora High School Resource Centre, linking the PRECIS subject indexing to the bibliographic data. The reference structure or semantic side of PRECIS will be developed simultaneously.

3. To produce, as the end product, a COM catalogue (Computer Output Microform) on microfiche, with

   a) a one-stage non-fiction subject catalogue with short form citations,

   b) a one-stage fiction subject catalogue with short form citations,

   c) author and title listings for fiction and non-fiction with short form citations.

4. To record relevant data, including cost data, by monitoring the system throughout the developmental period, editing, testing and evaluating both the processes and the product.

5. To evaluate user attitudes to the catalogue format and forms, both book and COM.

6. To evaluate against criteria of adequacy the performance of the catalogue in retrieving relevant materials.

7. To make specific recommendations for further development and research.

7. <u>Long-range objectives to which this study may contribute</u>

1. To provide a working model from which an Ontario-wide system might be developed for elementary and secondary school libraries. Such a cataloguing/information network could respond to a number of needs, as follows.

   a) Supply cataloguing data of a uniformly high standard to all schools. This would enable school libraries to emerge from their present isolation and participate, as they should, in the broader library world where information and resources are shared. School librarians would have more time to work with students and staff.

   b) Enable all school libraries to utilize a centrally-generated PRECIS file.

   c) Provide improved catalogues in book or microfiche form using the one-stage format which links the subject information to the individual citations.

2. To provide a base for investigating fully the potential of PRECIS as a learning tool.

8. Attainment of immediate objectives

A fuller description of the extent to which this project attained its immediate objectives is included in the Technical Report which follows.

In brief, the present study attained all but two of its immediate objectives. The production of a one-stage fiction subject catalogue on microfiche has been abandoned in favor of interfiling fiction with the non-fiction subject catalogue. The decision to interfile was taken in November, 1977. When it later became clear that the whole AHS collection could not be processed before September, 1978, the fiction collection was designated as a lesser priority. The study has also failed to develop a formal set of criteria of adequacy to judge the performance of the COM catalogue in retrieving relevant documents. This is due to delays in achieving an acceptable microfiche product. The performance of the COM catalogue will be judged after September, 1978.

The catalogues linking PRECIS subject indexing to the bibliographic data have been produced through UTLAS. The prototype print catalogues (two specimen pages appear as Appendix "A") have been in successful use for over a year and the COM catalogues are ready for trial (the AHS microfiche catalogues appear as Appendix "C").

The instruments and processes of this project have been under continuous staff review just as the first products have been under examination by users and interested onlookers. Many production problems which arose have been overcome and steps have already been taken to develop a new programme (PRECIS/CATSS) which will be more efficient.

There is no guarantee of easy or quick solutions to any problems such as might be encountered in applying PRECIS indexing to elementary school library collections or to establishing a model network of school libraries. However, there is every indication, given the success of the present project, that the long-range objectives are eminently attainable.

A COMPUTER-BASED CATALOGUE LINKING

THE PRECIS SUBJECT INDEXING SYSTEM TO SCHOOL LIBRARY MATERIALS

TECHNICAL REPORT

0 Introduction

0.1 The two-year pilot project was granted $125,000 through the Grants-in-Aid of Educational Research Program to the York County Board of Education in support of the proposal submitted by the co-principal investigators, Brian Burnham and Irene McCordick. Progress reports have been submitted at six-monthly intervals. This final report covers the period of the Project from its inception, July 1, 1976, to September 30, 1978. An extension for activities was granted beyond June 30, 1978, because of a series of setbacks in the developmental programme and production schedules.

0.2 In 1976 school libraries had not begun to utilize the technologies which have been revolutionizing information storage and retrieval in other educational institutions. Caught in a time lag which has perpetuated costly and inefficient manual systems, school libraries have not been able to share the advantages of receiving cataloguing and subject information through existing bibliographic networks.

0.3 Library literature reflects some concern regarding the underuse of school library collections because of inadequate subject access. Traditional subject heading lists such as Sears List of Subject Headings continue to be used although acknowledged to be unresponsive to the curriculum needs of students and teachers. Because the problem has been neglected by researchers, little has been accomplished in finding a solution.

0.3.1 PRECIS (PREserved Context Index System) was chosen as the method of subject indexing for the project as a result of its successful application in the experimental card catalogue at Aurora High School (AHS). This catalogue which provided subject access to both fiction and nonfiction materials had been used with enthusiasm by students and teachers since January, 1972.

PRECIS, a relatively new method of subject indexing, was designed for and implemented by the British National Bibliography in January, 1971. Its purpose was to provide a machine-produced subject index for the national bibliography. The main advantage of PRECIS is that it was designed for computer manipulation along with machine-held files of bibliographic records. Its merits reside in the characteristics of the subject entries, i.e.,

(i) multiple access points in the subject index to specific documents;

(ii) terms set in context for clarity of meaning;

(iii) specificity and currency in terminology drawn from the documents[1] indexed;

(iv) natural language order of terms;

(v) semantically-based thesaurus which produces the "See" and "See also" references.

0.3.2 The project is unique in its application of PRECIS. Other organizations use the method to create subject entries that summarize the content of a document. Recognizing the need to mine the resources of relatively small school collections, materials are analysed for important curriculum content. If required, a document may be indexed chapter by chapter. Analytical indexing produces more strings and index entries per document.

0.4 The primary purpose of the project is to build a model computer data base linking computer-held files of cataloguing information to computer-held files of subject data created by using PRECIS. The resulting model could serve to support the development of a cataloguing/information network for school libraries in Ontario.

0.4.1 Project goals, more fully described in the Narrative Report, are embodied in the following objectives:

(i) to test the capability of a large, well-established bibliographic network in providing a high percentage of cataloguing data for school library materials;

(ii) to test the feasibility of a school library contracting sharing agreements with other users of the network;

(iii) to assess the capability of the project staff to provide full cataloguing data for materials requiring original cataloguing to a standard MARC format acceptable to all users of the network;

(iv) to provide subject access to school library materials by using the PRECIS method for subject analysis and indexing in building the subject files;

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1 For the sake of brevity, the term "document" is used to denote both print and nonprint materials.

(v) to link the computer-held files of bibliographic data to the PRECIS files for the production of subject catalogues;

(vi) to test the book and COM (Computer Output Microform) forms of the author, title, and subject catalogues against criteria of adequacy.

1. Setting up the project

1.1 The PRECIS Project located in a seminar room of the Aurora High School Resource Centre began July 5, 1976. The first two months were spent in recruitment and training of staff, ordering equipment, planning and developing procedures, and establishing methods of budget control and reporting. Files were organized and record-keeping routines set up, including a daily journal. Necessary furnishings were supplied by the school board from surplus stock.

1.2 The research team included the following members.

(i) Co-principal investigator: Brian Burnham, Chief Research Officer, York County Board of Education, assigned 30 days over a two-year period.

(ii) Co-principal investigator: Irene McCordick, Master Teacher for Libraries, York County Board of Education, assigned 80 days over a two-year period. Miss McCordick retired from her teaching duties, December 30, 1977, but continued to give her support to the Project until June 30, 1978.

(iii) Project Officer: Audrey Taylor, Chief Librarian, Aurora High School, York County Board of Education, assigned 70% of her timetable to the project.

(iv) PRECIS Indexer: Claudia Willetts, formerly of College Bibliocentre, assigned full-time from July 1, 1976.

(v) Terminal operator: Lee-Ann McShane, a trained library technician, assigned full-time from September 1, 1976.

(vi) PRECIS Indexer: Carol Wiltshire, trained in PRECIS at Dalhousie University, assigned full-time from May 24, 1978.

1.3 Equipment for the project was acquired in stages. Since the grant was considerably less than the amount budgeted for in the original proposal, a saving was effected by postponing the installation of the computer terminal, the FX line, and the data set until

August 25, 1976. Replacement of parts of this equipment was necessary on several occasions. Stability was achieved October 15, 1976. An on-line printer was added in January, 1977.

The microfilm and microfiche readers required to read PRECIS reference tools from the British Library were loaned by schools within the County.

1.4 In August, 1976, the project became the only school user of the University of Toronto Library Automation Systems (UTLAS). This system provides central data base service for an increasing number of library systems in Canada. The Catalogue Support System (CATSS) allows access to over a million bibliographic records in the source files of the Library of Congress, the National Library of Canada, and Bibliothèque National de Québec. Since 1975 large public library systems have been creating their own files, within UTLAS, which they share with each other upon a written agreement to maintain prescribed bibliographic standards. Many of the benefits of automation in searching, cataloguing, and technical processing derive from participation in a shared network for maximum access to already catalogued bibliographic material. These total 4½ million records and grow daily.

UTLAS also houses the PRECIS software programme developed by College Bibilocentre in 1973 for the manipulation of PRECIS data.

1.4.1 The project entered into a sharing agreement with six large Ontario public library systems and Centennial College (College Bibliocentre). Further agreements were arranged with new members entering the network including the Professional Education Libraries (PEL), a consortium of six Ontario school boards and the Ministry of Education. The project was invited to send a member, as an observer, to the Metropolitan Toronto Technical Services Committee, a group which meets monthly to share ideas and discuss problems common to the network users.

2 Automation

2.1 Workflow

In 1976, the decision was made to prepare the Resource Centre materials by subject areas. This approach allowed the indexers to develop and assess terminology before input to the PRECIS files. Consultation with teachers, analysis of Ministry of Education guidelines and in-school course outlines helped to identify concepts and terms useful for the subject index. Subject analysis of the materials and the resulting strings were written with these guidelines in mind.

Initially, subject analysis and indexing preceded the on-line search for bibliographic records. Later developments affecting the structure of the PRECIS files required a revision in the workflow. The deriving and filing of the records became the first operation.

2.2 Development of PRECIS files

In July, work began with the manual preparations necessary for initializing the PRECIS computer files. There are two linked computer files in the PRECIS system:

(i) a SINfile which stores the PRECIS strings;

(ii) a RINfile which stores all the lead terms and the terms used for the "See" and "See also" references.

2.2.1 Computer coding of PRECIS data had not been required for production of the card catalogue. A new system for control of PRECIS strings was set up on concept cards which hold all the data required for their computer storage and manipulation. The concept cards hold the following:

(i) the terms in the string, each with its role operator and manipulation codes;

(ii) the Subject Indicator Number (SIN), a unique seven-digit number, including a check digit, assigned to each string in the system;

(iii) the Reference Indicator Number (RIN), a unique nine-digit number assigned to every lead term in a string, used as an address in the RINfile;

(iv) the accession number of each document indexed by the string, used as the link to the machine-stored bibliographic record for production of the subject catalogue.

2.2.2 A reference structure had not been developed for the card catalogue, but was for the computerized system. A 3" x 5" card file was established to hold pertinent information about each lead term in the system, viz:

(i) the term and its RIN;

(ii) synonyms, their RINs, and computer codes to produce "See" references, e.g.,

SPHENISCIFORMES See PENGUINS;

(iii) hierarchical terms, their RINs, and computer codes to produce the "See also" references, e.g.,

VERTEBRATES	SCIENCE
See also	See also
RODENTS	BIOLOGY

These cards are used for input to the RINfile and are consulted by the indexers for vocabulary control in the strings.

2.2.3 In late September, 1976, UTLAS made a strong recommendation for change in the structure of the SINfile. As already mentioned, the accession number of each document served as the link between the bibliographic and the PRECIS files. This method of linking involved a number of complex machine steps during the production of the subject catalogue. The replacement of the accession number with the RSN (Record Sequence Number), the unique number assigned by the computer to each bibliographic record, would simplify the machine process. As well, the use of the RSN as the link between the files would facilitate the development of an on-line information system giving access by subject terms. The inconvenience, extra man hours and computer time involved in executing this change to more than 1000 strings was weighed against the advantages of having, in time, an on-line enquiry system. The changeover was completed in March, 1977.

2.2.4 The delay in inputting the PRECIS strings forced the indexers to work blindly without an authority file of subject entries until June, 1977. Because of the enormous amount of data being loaded into both the SIN and RIN files at this time, the editing proved to be an onerous task and was not completed until August.

2.2.5 As the files of PRECIS data increased, duplicate use of strings, and use of analagous strings served to increase indexing speed. The rate of growth of the RINfile decreased except as terminology was developed for a new subject field. The status of the PRECIS files, June 30, 1977 (end of the first year of the project), was

(i)	PRECIS strings in SINFILE	1,692
(ii)	PRECIS strings ready to file	1,185
	TOTAL	2,877
(iii)	Reference terms in RINFILE	2,262

2.2.6 The project suffered a serious set-back when data in the computer-held PRECIS files were lost or destroyed on two different occasions, August 4-12, and September 16 to October 4, 1977. This was the result of improper back-up procedure of the PRECIS files during the installation of new computer facilities at UTLAS. The first recovery period was completed September 30; the recovery of the second loss was completed October 27. Little current PRECIS work was input during this time.

Costs arising from the losses were covered by UTLAS, and two of their staff members assisted in the recovery process. The project was assured that a comprehensive back-up procedure had been initiated for the PRECIS files. Two months of valuable time in the life of the project could not be recovered.

2.2.7 Indexing and building of the PRECIS files proceeded smoothly until May, 1978. The running of the authority file (required for editing before production of the COM catalogue) revealed a problem in the RINfile. A second cumulation was produced successfully. The amount of editing required necessitated the hiring of a second full-time PRECIS indexer in order to meet the deadline for catalogue production.

2.2.8 The indexing of the literature collection was postponed until June, 1978, pending a visit from Derek Austin of the British Library, originator of PRECIS. He proposed a significant change in the coding of strings for literature and music. It was decided to adopt the coding for trial use in the project.

The indexing of literature, regardless of the method used, is fraught with problems. The policies adhered to by the British National Bibliography in its application of PRECIS did not seem suited to the needs of students and teachers. The project pursued an approach more likely to reflect the curriculum. The intellectual analysis of the problem required about a month; careful records were kept of the logic developed to support the analysis. Some experimental strings appear in the COM catalogue. They are subject to revision following evaluation by PRECIS developers (e.g., D. Austin), users (e.g., students, teachers and librarians).

With the development of the new string formats, the indexing of the remaining titles in the literature collection is progressing rapidly. The intellectual analysis and resulting logic will be applied to the indexing of art, music, history and fiction.

2.2.9 Status of the PRECIS files, September 15, 1976, was

(i)	PRECIS strings in SINfile	6,575
(ii)	Reference terms in RINfile	5,736

2.3 Development of bibliographic files

The actual searching and deriving of the bibliographic records produced a number of problems initially. The period between September 1 to December 2, 1976, involved a concentrated learning experience for both the project team and the staff of the Resource Centre. Training programs offered by UTLAS were in the process of being developed. Difficulty was encountered in obtaining some of the necessary documentation for automation -- the standards and procedures for searching, deriving, and originating cataloguing data.

2.3.1 The building of the bibliographic file was suspended from October 21 to December 2, 1976, for a number of reasons, viz:

(i) to examine the processes and effect more appropriate utilization of the facilities offered by the CATSS system;

(ii) to provide time for the switching from accession number to the RSN in the SINfile;

(iii) to assess the workflow for modifications.

The decision was made to install an on-line printer to improve the workflow by producing hard copy of the bibliographic records for editing. Unreliable mail service frequently delayed copy sent by UTLAS. This equipment, installed in January, 1977, facilitated processing the backlog which was cleared in March, coinciding with the updating of the PRECIS files. The two processes became synchronized for the first time.

2.3.2 Status of the bibliographic file, June 30, 1977, was

(i)	records filed complete with PRECIS data	2,088
(ii)	records to be edited	512
(iii)	total number of records in file	2,600
(iv)	percentage of records derived	91%
(v)	percentage of records originated	9%

2.3.3 The building of the bibliographic file proceeded satisfactorily until November, 1977, when the first sample pages of the author and title catalogues were produced. They revealed a number of anomalies:

(i) variant of an author's name in the derived records;

(ii) incorrect coding of non-filing characters in a title, e.g., "a", "an", "the" in the derived records.

While inconsistencies occur in card catalogues, much to the annoyance of library patrons, such inaccuracies are seldom corrected. The errors become highly visible in a computer-produced catalogue and cannot be tolerated.

The solving of the first problem required the establishment of a card authority file of authors' names. This meant a manual search of 3000 bibliographic records and on-line editing for necessary changes. Simultaneously the records were searched for errors in the non-filing characters in titles. All corrections were made before the running of the two catalogues in February, 1978.

2.3.4 In April, 1978, the decision was made to assess the problems in the handling of cataloguing data for nonprint materials, in particular, filmstrips. The MARC format for this type of material is not entirely stable. Also, there is a scarcity of nonprint records in the network apart from 16mm films. As anticipated, few records were located during a trial search. The search procedures are hindered by the lack of an international standard number such as those assigned to books (ISBN) and by a title search limited to 40 characters. It was decided to do original cataloguing for all the filmstrips. Bibliographic data sheets were designed and the cataloguing was done by the Resource Centre staff ready for input. The cataloguing proved to be an arduous task because of inconsistencies even within the works of a single producer. The indexing, by comparison, was simple. By the end of July, 1978, the bibliographic file contained records for 335 filmstrips.

2.3.5 Status of bibliographic file, September 15, 1978, was

(i)	records filed complete with PRECIS data	4,826
(ii)	records to be edited	150
(iii)	total number of records in file	5,076

(iv) percentage of records derived 81%

(v) percentage of records originated 19%

3 Products of the system

3.1 Shelf list cards

During the first six months, specifications for the shelf list cards were completed. This card file is necessary for the internal control of a library collection. Modifications were made later to accommodate the idiosyncracies of nonprint data.

3.2 Catalogues

3.2.1 The subject catalogue designed by the project and programmed by UTLAS is unique both in its application of PRECIS and in the form of the bibliographic citations.

PRECIS was designed to produce a back-of-the-book index for a classified catalogue. This is called a two-stage catalogue, a form rarely used in North America.

The project's PRECIS subject catalogue is the world's first computer-produced one-stage catalogue using PRECIS. The subject entry is printed, followed immediately by the classification number and the citations for the documents in which the information can be found. The PRECIS strings are not attached to Dewey classification numbers as is the practice of the British National Bibliography. The AHS project's subject entries bring together information otherwise scattered by the assigned Dewey classification numbers.

The citations are deliberately brief. (See Appendix "A".) The design is based on recent research regarding catalogue entries and on practical experience indicating that very little of the bibliographic record contained on the traditional card is used by the seeker of information.

The target date for specifications of the subject catalogue was November 16, 1976. Programming was postponed until the following February because of the installation and debugging of new computer facilities at UTLAS. The first sample pages received in early March were encouraging. A cut-and-paste revision was submitted to UTLAS. The prototype PRECIS subject catalogue, based on 100 titles from the cooking collection of the Resource Centre, was received in April, 1977. Considerable enthusiasm was expressed both in Aurora High School and the British Library's Bibliographic Services Division.

The first interdisciplinary subject catalogue was produced in mid-November, 1977, based on approximately 2500 records in the bibliographic file. It was bound in two volumes of 905 pages. As the data loss in the PRECIS files had caused delay in the target date for this catalogue, the decision was made to cancel a second book product. The team concentrated on increasing the size of the files for the microfiche catalogues scheduled for late Spring, 1978.

3.2.2 Specifications for the author and title catalogues were submitted to UTLAS in May, 1977. The sample author and title pages were ready in November. Minor changes were made. The production of the catalogues was delayed until the following February, allowing for the necessary corrections to be made to authors' names and non-filing characters in the bibliographic files.

The first author and title catalogues were received early in February, 1978. Because of an error made in the selection of the correct status code in bibliographic records, 1500 titles were dropped. A rerun of the catalogues the following week resulted in a satisfactory product which included 2,944 titles. As with the subject catalogue, the production of further author and title listings was postponed pending the COM product scheduled for the Spring.

3.2.3 The samples of the microfiche catalogue at 48X (48 times) reduction were ready in April, 1978. Minor changes were made in the specifications, including a change to 42X reduction. The product was rejected twice because of the poor readability. While microfiche is a throw-away resource, quality is an important factor when introducing students and teachers to a new concept in library catalogues.

While mid-May was the target date set for the COM product, a number of delays postponed the run to June 9. The catalogues arrived in Edmonton in time for the project's PRECIS workshops presented at the annual conference of the Canadian Library Association.

Later analysis of the microfiche subject catalogue revealed some errors in programming which resulted in the disruption of the author statement and failure to pull the media designator for the filmstrips. A rerun of the COM catalogues was postponed to September. The final product appears in Appendix "C". Close examination will reveal a few remaining technical errors, but all can be resolved.

3.3 It should be noted that in all instances where errors have been made by UTLAS in programming or running products, the costs have been recovered by the project.

4 Dissemination of information

4.1 One of the major responsibilities assumed by the administrators of the project was the dissemination of information regarding the potential of the model and PRECIS as a new method for subject access to library materials. Various methods were employed:

(i) in-house PRECIS workshops;

(ii) presentations to professional groups and educational institutions;

(iii) publications;

(iv) course in PRECIS indexing;

(v) co-ordination with other PRECIS users in Canada;

(vi) correspondence with Derek Austin of the British Library;

(vii) correspondence in response to inquiries in Canada and other countries;

(viii) reports to the Ministry of Education and senior administrators of the York County Board;

(ix) discussions with administrators and personnel from other School Board jurisdictions.

(See Appendix "B".)

5 Systems development

5.1 Study tour in England, organized through Derek Austin, helped resolve a number of systems development problems.

5.1.1 Questions arising during the course of the project, as well as a proposed upgrading of the PRECIS programme by UTLAS, resulted in the Project Officer taking a three-week study tour to England in March, 1978. The purpose of the trip was to meet with Derek Austin of the British Library, the PRECIS team of the British National Bibliography, and other institutions using PRECIS. The information sought concerned the problems of sharing and control of PRECIS data in a network; the training of PRECIS indexers; new developments in the PRECIS programme including new codes and the multilingual/translingual applications.

5.1.2 The study tour began with auditing a five-day PRECIS course, part of an internal training programme offered to British Library staff. The information and materials gathered at this time served as the basis for the six-day PRECIS indexing course given in Toronto in July, 1978.

5.1.3 Four days were spent with the PRECIS staff of the British National Bibliography, an on-the-bench experience which provided an opportunity to analyse each step of the procedures used in building their PRECIS files.

5.1.4 Time was given to discussion with Derek Austin's research staff presently engaged in developing a general English thesaurus for access to the PRECIS data of the British National Bibliography. Thesaural construction is essential for automated systems; there are as many theories as there are thesauri, although progress is being made in establishing standards. The creation of such a tool has already become necessary for some PRECIS users in Canada who have on-line search capabilities, e.g., ONTERIS and the Ontario Institute for Studies in Education's EISO facility.

5.1.5 The British Library's translingual research team, under the direction of Derek Austin, has made considerable progress in the intellectual development of a computer switching technique to be used for the instant translation of PRECIS strings from one language to another. This work, when completed, could help to resolve the indexing problems of a bilingual country like Canada. The team did an analysis of the project's one-stage PRECIS subject catalogue. The diagnosis was encouraging: adherence to PRECIS logic and the simplicity of the strings would be amenable to translingual switching.

5.1.6 The staff of the British Education Index, following an examination of the AHS prototype one-stage catalogue, had decided to survey its subscribers in regard to initiating this format for its own publication.

5.1.7 The British Universities Film Council provided information about their indexing procedures used for 16mm film.

5.1.8 Time spent at the Resource Centre of the Inner London Educational Authority (ILEA) was particularly interesting. Cataloguing for monographs held by their Resource Centre is derived from the British Library MARC records which contain PRECIS subject information. Nonprint materials, as in Canada, are not handled by a national authority. ILEA, in cooperation with the British Library, has undertaken a research project to catalogue and index 6,700 nonprint items using PRECIS. This study, the British

Library Learning Materials Recording Study, will be completed in November, 1978. The Authority plans to investigate the feasibility of establishing a central cataloguing support system for its school libraries.

5.1.9 Materials gathered from an examination of the present library cataloguing network used in Britain, the British Library Automated Information Service (BLAISE) and MERLIN, a new system under development, have been given to the staff of Systems Development at UTLAS.

5.1.10 A research team from Liverpool Polytechnic, Department of Library and Information Studies, has been investigating indexer reaction to PRECIS for the British Library. In June, 1977, the Project Officer responded to a questionnaire sent by the team. A personal interview was conducted in Liverpool. Their report was published in May, 1978.

5.1.11 During the three-week period, many valuable hours were spent with Derek Austin. He examined the one-stage interdisciplinary subject catalogue and suggested that the project has great potential. Already the accomplishments have had impact: a computer-produced one-stage PRECIS subject catalogue; the use of short citations; the choice of title as the main entry for the citations. As well as the British Educational Index considering this format, the British National Bibliography has found this unique catalogue worthy of consideration for future products.

5.1.12 The fact-finding tour resulted in a number of benefits to the project and other Canadian users of PRECIS:

(i) acknowledgement of the integrity and potential of the project;

(ii) confirmation that, in the development of a network, there is a need for central control of PRECIS data;

(iii) confirmation that a networking system requires the development of sharable source files;

(iv) encouragement to experiment with nonprint media;

(v) materials for developing an in-house PRECIS training course offered by the ONTERIS Project and the Aurora PRECIS Project;

(vi) planning for a consultative visit by Derek Austin to ONTERIS and the Aurora PRECIS Project in June, 1978;

(vii) information pertinent to the developmnet of a new PRECIS programme by UTLAS.

5.2 In June, 1978, Derek Austin and Mrs. Jutta Sørensen, then of the Bibliotekscentralen, Denmark, and consultant to the British Library multilingual/translingual projects, spent a week in Toronto en route to the University of British Columbia, the Canadian Library Association annual conference in Edmonton, and the University of Maryland, U.S.A. The week included discussion with the Systems Development staff at UTLAS, consultation with the PRECIS teams of ONTERIS and Aurora, and a two-day PRECIS workshop for a selected audience of potential PRECIS users and indexers. About thirty-five people attended.

5.3 A six-day PRECIS course was developed by Audrey Taylor, Project Officer of the Aurora Project, and Ilze Cockburn, PRECIS indexer for ONTERIS, in response to a lack of trained PRECIS indexers in Canada. Nine people enroled in the course, including three members of the ONTERIS staff, two school librarians, two cataloguers from a metropolitan Toronto school board, and two Master Teachers of the York County Board of Education. The course ran from July 6-12, 1978.

5.4 A number of meetings have been held with UTLAS staff for consultation in regard to three important issues:

(i) the design of a cost-effective structure for a cataloguing/information network for elementary and secondary school libraries in Ontario;

(ii) the designing of a new PRECIS programme for on-line subject access; including new British Library developments;

(iii) structure and control of central PRECIS source files for network sharing.

5.4.1 After careful consideration, UTLAS has recommended that a separate union bibliographic file be established for each of the secondary and elementary panels. One record for each title will be held in the appropriate file(s); a local holdings code will identify the individual school for the purpose of producing catalogues unique to each school. A union list of holdings can also be produced for use as a selection tool and to facilitate interlibrary loan.

The system will be tested beginning in October, 1978, with the creation of a bibliographic file for three new elementary schools in York County.

The source files of PRECIS data originated for the project will expand to include strings and references generated from the subject analysis of the elementary school materials.

5.4.2 Users of PRECIS were notified in April, 1978, of the intent of UTLAS to upgrade the existing programme which had not been designed to accommodate multiusers and large volumes of input and product output. One advantage of the new system is on-line access by subject terms. PRECIS will be integrated into the new authorities system being developed for CATSS users and will be known as PRECIS/CATSS. Discussions held with Derek Austin in June, 1978, and input from present PRECIS users have helped to shape the new package. UTLAS recommended the formation of a PRECIS Users Group to liaise with their Systems staff.

5.4.3 The PRECIS Users Group was formed in August, 1978, and includes representatives from ONTERIS, the Aurora PRECIS Project, National Film Board of Canada, and the Canadian Nonprint Project. Three meetings have been held to date; two critical meetings are planned for early October.

5.4.4 The projected target date for implementation of PRECIS/CATSS is March, 1979. It is anticipated that the process will take three to four months. The Aurora PRECIS Project, as the largest user of PRECIS, has been invited to test the new system. Negctiations are in progress.

6 Objectives attained by the developmental research project

6.1 The long-range goal of the project was to provide a working model from which an Ontario-wide cataloguing/information network might be developed. The limits of the two-year developmental period were stated in terms of immediate objectives. Despite a number of serious setbacks already noted in this report, almost all these objectives were attained.

6.2 A model computer data base linking a file of bibliographic records to files of PRECIS subject information has been achieved and is operating successfully to produce author, title, and subject catalogues for the Resource Centre of Aurora High School. The introduction of new technological developments over the two-year period has necessitated reassessment and modification of the objectives.

6.2.1 It was anticipated, initially, that the bibliographic file would hold 10,000 records at the end of two years. An inventory of the resources, including nonprint materials, on September 15, 1978, assessed the size of the AHS Resource Centre holdings at approximately 9,680 titles. (A decrease in the AHS library budget and buying power, combined with losses over the two years, account for

the inaccuracy of the original estimate.) The number of bibliographic records in the computer files on this date was 5,076, representing 52.44% of the collection.

The process of deriving bibliographic records was more complex than originally envisioned. Considerable editing was required to correct anomalies and make necessary changes in the cataloguing record. The object is to maintain a clean file of records. Some of the major problems have been solved.

The percentage of records derived from the network has surpassed expectation. Until the introduction of nonprint materials, the hit rate was 91%. The hit rate dropped to 85% because all the filmstrips required original cataloguing. It is anticipated that the need for original cataloguing will drop when the National Film Board of Canada inputs bibliographic records for Canadian film media and when UTLAS mounts the British Library MARC records, perhaps in the near future.

Of the bibliographic records derived for book titles, approximately 54% were located in the Library of Congress source file, 12% from the National Library of Canada file, and 34% from the other network users with whom the project contracted sharing agreements.

Statistical reporting initiated by UTLAS during the second year indicates that other members of the network are using the project's bibliographic file for deriving their records. There have been no complaints received regarding the quality of our work, thus indicating that a school library system could participate successfully in a large bibliographic network.

6.2.2 The size of the PRECIS files fell short of the original estimate for the SINfile but not for the RINfile. This can be attributed in part to major losses of time related to the change in the SINfile structure as well as loss of data in both the SIN and RIN files. Of the estimated 10,000 strings, the SINfile holds 6,575 strings; of the estimated 4,500 reference terms, the RINfile holds 5,736 terms.

The reference file has added a new dimension to the former manual system. The development of the RINfile has progressed relatively smoothly, aided by the British Library reference tools on microfiche donated to the project by Derek Austin. While there are major differences in terminology in use in Canada and England, some subjects, e.g., the "hard" sciences, share common terms and hierarchies.

6.2.3 Major intellectual problems occur in indexing when the analysis of materials in a new subject discipline begins. Time must be taken to consult the curriculum guidelines of the Ministry of Education, in-house course specifications, teachers of the subject and other specialists in the field. Terminology is developed and tested in relation to curriculum needs and the degree of specificity required. Once sample strings have been developed, the subject analysis and indexing tasks proceed rapidly. The increase in duplicate use of strings and access to analogous strings has also speeded the indexing procedures.

A major problem is the lack of daily access to the authority file of strings and terms in the data base. Alphabetized cumulations of the SIN and RIN files have become costly to print and are now produced intermittently. This is a great inconvenience to indexers. Means of ameliorating this situation are presently being investigated to discover a more satisfactory interim measure until access by subject term becomes available on-line through the PRECIS/CATSS authority system.

6.3 In spite of a variety of technical problems, the book catalogues produced from the model data base have lived up to expectation. While there has been insufficient time to assess them against criteria of adequacy, informal evaluations have indicated the products are very acceptable to both students and staff. Assessment of the COM catalogues has had to be postponed due to production delays.

6.3.1 The Resource Centre staff was asked to observe the reactions of students, to assist if necessary and to note any problems in using the book catalogue. The only real complaint is that the PRECIS subject catalogue does not include the entire collection. Some students commented that the entries, followed by the citations are easy to read and provide quick access to the required materials. Others have observed that the subject catalogue is similar in format to the familiar Reader's Guide to Periodical Literature and the National Geographic Index.

6.3.2 A simple evaluation test designed for Grade 9 General students involved a search in both the card catalogue and the subject book catalogue. Their English teacher, in assessing the results, found that the students were able to locate more specific information in the book catalogue. Each student was asked to express in his own words his attitude towards the two forms. The conclusion drawn from analysis of the statements is that the book form was convenient to use, more easily scanned and resulted in faster retrieval of information.

6.3.3 Department heads whose subject area had been indexed requested copies of the subject catalogue for their offices. The teachers soon discovered that not only does it give information about the support materials available in the Resource Centre, but allows them to make informed recommendations for purchase based on curriculum needs.

6.3.4 Little work was accomplished in the indexing of fiction. Consultation with teachers of English indicated a wide diversity of opinion in assessing the needs of users in this area. As a result, the indexing was postponed. Some trial strings were included in the COM catalogue for comment. The citations have been interfiled with those of non-fiction works, rather than printed in a separate catalogue and this direction is indicated for the future.

6.4 Although expenditures were in line with estimated costs as set out in the proposal for the project, not as many documents were processed or catalogues produced as were scheduled. Estimates were based on the best data available in January, 1976. Some of the problems encountered during the project could not have been foreseen then.

Budget statement analysis reveals that the only substantial cost overruns were in data processing and communications, and in personnel costs. These cost overruns can be attributed to a number of factors:

(i) higher rates (both telephone and UTLAS rates increased twice);

(ii) additional equipment (an on-line printer);

(iii) unexpected additional editing of bibliographic records;

(iv) underestimated costs of PRECIS edit lists and cumulative authority files;

(v) failure to budget for shelf list cards;

(vi) additional indexer employed from May 24, 1978, to assist with PRECIS indexing and editing before production of the COM catalogue.

7 Other observations

7.1 There are certain problems inherent in a developmental research project of this kind. One of the major difficulties lies in working with an active collection of materials. Documents withdrawn for

processing were frequently returned to the shelves before completion because of student assignments. Some inconvenience to students, teachers, Resource Centre staff, and the project team was inevitable, but was borne with considerable magnanimity. A marked advantage, however, was the opportunity for constant interaction with staff and students which led to improvement in subject entries.

7.2 School librarians from across Canada have expressed enthusiasm for the depth and specificity of PRECIS entries and the related references, features lacking in present card catalogues.

7.3 Copies of the subject catalogue have been given to Simcoe Composite School, Norfolk County, and North Park Collegiate and Vocational Institute, Brant County. The librarians of the two schools have responded enthusiastically to the product, finding it a useful guide to their own collections. They look forward to receiving the COM catalogue. Requests for information, visits, or the catalogue have been made by librarians working as far apart as a high school in Pointe Claire, Quebec, and the Faculty of Library Science, University of Alberta. Requests from outside Canada have come from Australia, Germany, Poland, the United Kingdom, and the United States.

7.4 Copies of the catalogues have been given to the British Library and Liverpool Polytechnic, Department of Library and Information Studies. The subject catalogue is used for study of the application of PRECIS in a one-stage catalogue.

7.5 The author and title catalogues have caused little comment, thereby supporting the thesis held by the project administrators, that library users make greater use of the subject catalogue when seeking information.

8 Recommendations

8.1 Continue to utilize high technology with the aim of developing a cost-effective cataloguing/information network using PRECIS for school libraries in Ontario. Further development and testing will be required before such a network could be implemented. This could involve seven lines of action.

8.1.1 Increase the size of the bibliographic file of secondary school materials by completing the collection of the Aurora High School Resource Centre.

8.1.2 Initiate the building of a bibliographic file of elementary school materials.

8.1.3 Increase the size of the present PRECIS files of subject strings and references for secondary school materials and add those for the elementary school materials.

8.1.4 Establish a mini-network of elementary and secondary school libraries in order to test the operational viability of a network capable of serving the schools in the Province of Ontario.

8.1.5 Continue to cooperate with UTLAS in the development of an on-line PRECIS authority system in order to control costs and increase efficiency.

8.1.6 Evaluate against criteria of adequacy (which require refinement) user attitudes to and the effectiveness of retrieval using the one-stage PRECIS subject catalogue.

8.1.7 Initiate research to assess the potential of PRECIS as a learning tool.

8.2 Encourage what enthusiasm has already been expressed by some school boards in the province by inviting them to share in the work and costs of pioneering a system of benefit to all.

8.3 Continue the dissemination of information about the products and the potential of a cataloguing/information network.

8.4 Continue to cooperate with PRECIS users in Canada in order to assess the viability of a shared PRECIS national authority file.

8.5 Encourage quality production of microfiche and microfilm in Canada.

GLOSSARY

Bibliographic data base. Computer storage of cataloguing data for production of catalogues, shelf lists, spine labels, etc.

Bibliographic network. Central data base service shared by a number of library systems for maximum access to bibliographic records.

Bibliographic record. Full cataloguing data for a document.

CATSS (Catalogue Support System). UTLAS bibliographic data base service which provides cataloguing and technical processing for library systems.

Classified catalogue. A listing of bibliographic citations arranged by a classification system with a separate subject index, e.g., the British National Bibliography which has a back-of-the-book subject index.

COM (Computer Output Microform). Computer tape output reproduced by microphotography either on microfilm or microfiche.

Lead term. A word or compound term used as a point of entry in a subject index.

MARC (Machine-readable Cataloguing). A cataloguing format (on magnetic tape) developed by the Library of Congress to facilitate sharing data nationally and internationally. MARC records can be manipulated by a computer to produce, for example, a COM catalogue. Many countries have their own adaptation, e.g., CAN/MARC, UK/MARC.

ONTERIS (Ontario Educational Research Information System). A project of the Ontario Ministry of Education and the Metropolitan Toronto School Board which uses PRECIS to access abstracts of research reports.

On-line access. The interaction of a computer terminal with computer-held files for searching, deriving editing, and storing information.

One-stage catalogue. Links a subject entry directly to the relevant citations. (Cf. the two stage, classified catalgoue in which the subject entry is listed in an alphabetical index pointing to a separate classified section containing the citations.) Appendix "A" is from a one-stage PRECIS subject catalogue.

RIN (Reference Indicator Number). In PRECIS, the unique number given to each term stored in the reference file.

RINfile. The machine-stored file of lead terms and all other terms used for "See" and "See also" references for a PRECIS index.

Role operator. A computer code which specifies the grammatical role or function of the term and which in turn regulates the order of terms in a PRECIS string.

RSN (Record Sequence Number). A unique number assigned by the computer to each bibliographic record in a machine-held file.

SIN (Subject Indicator Number). In PRECIS, the unique number assigned to the 'string' to identify the total subject packet. The SIN is entered in the bibliographic record of all documents to which the indexing data are applicable.

SINfile. The machine-held file of PRECIS subject data.

String. In PRECIS, a syntactically ordered sequence of terms from which the computer generates index entries.

UTLAS (University of Toronto Library Automation Systems). A large data base of bibliographic records for shared cataloguing situated in the Robarts Library, University of Toronto.

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Part 3, Sørensen, Jutta and Derek Austin. "Multilingual experiments, proposed codes, and procedures for the Germanic languages", Libri, Vol. 26 (September, 1976);
Part 4, Lambert, G. "The application of PRECIS in French", Libri, Vol. 26 (December, 1976).

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APPENDIX "A": AURORA HIGH SCHOOL LIBRARY PRECIS SUBJECT INDEX

THERMODYNAMICS
See also
ENTROPY
HEAT
KINETIC MOLECULAR THEORY

THERMODYNAMICS
Laws
530 BAI Liberal arts physics: invariance and change. Bailey, John M. (1974)
530 BRA Principles of physics and chemistry. Breckenridge, J. Bruce. (1970)
530 CAR Physics from the ground up. Carr, Herman Y. (1971)
541.3 AND Introductory physical chemistry. Andrews, Donnid Hatch. (1970)
541.302457 VIL Basic physical chemistry for the life sciences. Villiams, Virginia R. 2d ed. - (1973)
541.369 BAU An introduction to equilibrium thermodynamics. Bauman, Robert Poe. (1966)

THESAURI
English language. Antonyms & synonyms
REF 428 ROG Roget's international thesaurus. Roget, Peter Mark. 3d ed. 1962
424 NEV The New American Roget's college thesaurus in dictionary form. (1962)

THESEUS & THE MINOTAUR. Ancient Greek legends
Historical sources
913.031 CER Gods, graves, and scholars. Ceram, C. V. 2d, rev. and substantially enl. ed. -- 1973

THINKING See THOUGHT PROCESSES

THIRD WORLD NATIONS See DEVELOPING COUNTRIES

THOUGHT PROCESSES
See also
REASONING

THOUGHT PROCESSES
[related_to language use
422 CON Semantics and communication. Condon, John C. (1966)

THOUGHT PROCESSES. Teenagers
Logical thought processes. Development [related_to development of logical thinking in children
155.413 INH The growth of logical thinking from childhood to adolescence. Inhelder, Bärbel. (1958)

THREATENED See ENDANGERED

TIDAL POWER
Use in generation of electricity
333.7 HAL Earth, water, wind, and sun, our energy alternatives. Halacy, Daniel Stephen. c1977
551.4708 CLA Tides: pulse of the earth. Clancy, Edward P. 1968

APPENDIX "A": AURORA HIGH SCHOOL LIBRARY PRECIS SUBJECT INDEX

VIRUSES
-- Scientific American readings
REF 570 SCI Scientific American resource library. Scientific American. 1969
574.8 HAN The chemical basis of life. Hanawalt, Philip C., comp. [1973]

VIRUSES
Interactions with host organisms
576.64 THO The virus realm. Thompson, Paul D. [1st ed.]. -- [1968]
616 ENE Enemies of man. 1970

VISIBLE LIGHT See LIGHT

VISION
See also
BLINDNESS
EYES
VISUAL PERCEPTION

VISION. Animals
500.2 MUE Light and vision. Mueller, Conrad George. [1966]
500.9 TIN Animal behavior. Tinbergen, Nikolaas. [1965]
574.19153 VOL Photobiology. Volken, Jerome J. [c1968]
591.182 BUR The sixth sense of animals. - Burton, Maurice. [1974, c1972]

VISUAL PERCEPTION
See also
OPTICAL ILLUSIONS

VITAMIN B6
Use in treatment of diseases
615.328 ELL Vitamin B6: the doctor's report. Ellis, John M. [1st ed.]. -- [1973]

VITAMINS
See also
VITAMIN B6

VITAMINS
REF 616 BET Better Homes and Gardens family medical guide. [1973]
500.2 SEB Food and nutrition. Sebrell, William Henry. [1967]
615.1 POI Understanding medications. Poitevin, Rene'. c1973
641.1 DAL Vitamins and mineral salts. Dalles, Dorothy M. 1974
641.1 LER The complete family book of nutrition and meal planning. Le Riche, V. Harding. c1975
641.1 PYK Success in nutrition. Pyke, Magnus. c1975

VOCAL MUSIC
See also
FOLK SONGS

APPENDIX "B": DISSEMINATION OF INFORMATION

1. Conferences

(i) International PRECIS Workshop, University of Maryland, October 15-17, 1976. Paper by Audrey Taylor, "Manual application of PRECIS in a high school library" published in the proceedings of the workshop. (See bibliographic entry under Wellisch.)

(ii) 18th Annual Conference of the Ontario Educational Research Council, Toronto, December 4, 1976. Paper by Audrey Taylor, assisted by Irene McCordick and Brian Burnham, "PRECIS, an automated information retrieval system for school libraries".

(iii) Ontario School Libraries Association, Toronto, February 4, 1978. Paper by Audrey Taylor and Irene McCordick, "A report on the Aurora PRECIS Project".

(iv) 1st Annual Conference of the Indexing and Abstracting Society of Canada/Société Canadienne Pour L'Analyse de Documents, Edmonton, July 14, 1978. Paper by Irene McCordick, "A survey of PRECIS in Canada; its use and users".

(v) 33rd Annual Conference of the Canadian Library Association, Edmonton, June 15-20, 1978.
- (a) Paper by Audrey Taylor, Irene McCordick, and Brian Burnham, "Workshop on PRECIS: a new method of subject indexing". June 16, 1978 (repeated June 17). Sponsored by the Canadian School Libraries Association/Learning Resources Council.
- (b) Panel presentation by: Colin Neale, National Film Board of Canada; Helene Rothwell, Centre for Research in Librarianship, University of Toronto; Audrey Taylor, Aurora PRECIS Project, "Canadian audio-visual materials system". June 17. Sponsored by the Canadian School Libraries Association/Learning Resources Council.
- (c) Paper by Brian Burnham, "Nuggets, stones or fool's gold? research as a change agent in Canadian libraries". June 19. Sponsored by the Committee on Library Research and Development

(vi) Annual Conference of the Ontario Library Association, London, Ontario, October 27-29, 1978. Paper to be given by Audrey Taylor.

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(vii) Conference on Research and Development in Librarianship, Faculty of Library Science, University of Toronto, October 30, 1978. Invitational conference limited to 24 Canadian library authorities including Brian Burnham and Audrey Taylor.

2. PRECIS workshops

(i) Three introductory workshops, "PRECIS and the Project", for York County school librarians and invited guests, at Aurora High School, September 29, October 6 and November 16, 1978. Assisted by Ilze Cockburn, ONTERIS.

(ii) Canadian Association of Information Science, Toronto Branch, January 27, 1977. Joint presentation by:Ilze Cockburn, ONTERIS; Chris Robinson (formerly College Bibliocentre); Audrey Taylor, Aurora PRECIS Project.

(iii) Presentation to Ministry of Education, Department of Research and Evaluation. Attended by other Ministry personnel, representatives from OISE, ONTERIS, UTLAS, senior administrators of the York County Board of Education, Aurora High School administrators, Resource Centre staff and Project team, at Aurora High School, May 2, 1977.

(iv) Presentation to Ontario media consultants, members of the Faculty of Library Science, and Robarts Library, University of Toronto; Norfolk County school board trustees, at Aurora High School, May 13, 1977.

(v) Presentation to York County School Librarians and local public library administrators, at Aurora High School, May 30, 1977.

(vi) Presentation to Ministry of Education, Department of Research and Evaluation, Progress Report. Discussion of future cataloguing/information network for school libraries in Ontario, at Aurora High School, November 23, 1977.

(vii) Brant County Secondary School Librarians' Association, Pauline Johnson Collegiate, Brantford, November 30, 1977. Presentation by Audrey Taylor and Irene McCordick.

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(viii) Central Ontario Regional Libraries, Richmond Hill, December 7, 1977. Presentation by Audrey Taylor and Irene McCordick.

(ix) Queen's University, Faculty of Education, Specialist's Course in School Librarianship, Kingston, July 25, 1978. A repeat of the workshop given at CLA, June, 1978, by Audrey Taylor, Irene McCordick and Brian Burnham, supplemented with an afternoon workshop on PRECIS indexing methods by Audrey Taylor.

3. Meetings and consultations

(i) Derek Austin, Ottawa, July 14-15, 1977; London, England, March 4-25, 1978; Toronto, June 5-9, 1978.

(ii) ONTERIS, February 2, April 3, 1978, re: upgrading of PRECIS programme; establishment of common references/RINfile; generation of a document on the advantages and disadvantages of PRECIS.

(iii) Helen MacIntosh, Head of Technical Services, Mississauga Public Library System, November 24, 1976, October 12, 1977, re bibliographic files.

(iv) Canadian Nonprint Project, February 26, April 6, April 25, 1978, re cooperation and coordination in the use of PRECIS.

(v) National Film Board of Canada, January 6, March 13, April 6, June 8, August 3, September 6, 1978, re cooperation and coordination in the use of PRECIS.

(vi) UTLAS, January 19, April 14, April 25, June 5, October 13, 1978, re the technical problems of establishing a mini-network and the development of a new PRECIS programme.

(vii) Toronto Board of Education, April 24, June 22, June 29, 1978, re participation in the development of a network for school libraries in Ontario.

(viii) Judy Gardhouse and Regine Dotrement, PRECIS indexers for the National Film Board of Canada, August 28, September 29, 1978.

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4. Visitors to the project

(i) Gladys Todd and Garnet Trivett, secondary school librarians from Norfolk County school board, July, 1976.

(ii) Lucille Boone, PRECIS indexer, University of Wollongong Project, New South Wales, October 6, 1976.

(iii) A group of gifted children from Stuart Scott Public School with Lorne Cook, Consultant for Gifted Children, York County Board of Education, April 14, 1977.

(iv) Toronto Board of Education, staff of central technical services, July 7, 1977.

(v) Peter Duchesne, librarian, Consumer and Corporate Affairs, Ottawa, September 2, 1977.

(vi) Al Sovran, librarian, North Park Collegiate and Vocational Institute, Brantford, December 13, 1977.

(vii) Librarians from Central Technical School, Toronto Board of Education, February 17, 1978.

(viii) Philip Harber, Lakeshore School Board, Pointe Claire, Quebec, March 29, 1978.

(ix) Fanny Burke and Ron Crawford, secondary school librarians, Hamilton, April 21, 1978.

(x) York Borough secondary school librarians, June 27, 1978.

5. Informal publications

(i) A PRECIS primer prepared by Audrey Taylor and Ilze Cockburn for the Ministry of Education, Department of Research and Evaluation, "PRECIS: the Preserved Context Index System; a method of subject analysis and indexing".

(ii) A three-page inclusion by Irene McCordick and Audrey Taylor for the revised edition of Cataloguing for School Libraries, requested by the editors, Pauline Fennell, Marilyn Kogan and George Whalen.

APPENDIX "C": Aurora High School Microfiche Catalogue
(authors, titles, and subjects indexes)